IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:

Charles L. Epstein, et al.

Confirmation No.: 3887

Application No.: 10/734,799

Group Art Unit: 2862

Filing Date: December 12, 2003

Examiner: Not Yet Assigned

For: PRACTICAL PULSE SYNTHESIS VIA THE DISCRETE INVERSE SCATTERING TRANSFORM

DATE OF DEPOSIT: *April 19, 2004*

I HEREBY CERTIFY THAT THIS PAPER IS BEING DEPOSITED WITH THE UNITED STATES POSTAL SERVICE AS FIRST CLASS MAIL, POSTAGE PREPAID, ON THE DATE INDICATED ABOVE AND IS ADDRESSED TO THE UNITED STATES PATENT AND TRADEMARK OFFICE, P.O. BOX 1450, ALEXANDRIA, VA 22313-1450.

TYPED NAME: Elizabeth A. McLoud

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

INFORMATION DISCLOSURE STATEMENT

Pursuant to 37 CFR § 1.56 and in accordance with 37 CFR §§ 1.97-1.98, information relating to the above-identified application is hereby disclosed. Inclusion of information in this statement is not to be construed as an admission that this information is material as that term is defined in 37 CFR § 1.56(b).

☒   In accordance with § 1.97(b), since this Information Disclosure Statement is being filed either within three months of the filing date of the above-identified application, within three months of the date of entry into the national stage of

the above identified application as set forth in § 1.491, before the mailing date of a first Office Action on the merits of the above-identified application, or before the mailing date of a first Office Action after the filing of request for continued examination under § 1.114, no additional fee is required.

☐   In accordance with § 1.129(a), this Information Disclosure Statement is being filed in connection with ☐ the first or ☐ second After Final Submission, therefore:

> ☐   Certification in Accordance with § 1.97(e) is attached; or

> ☐   The fee of **$180.00** as set forth in §.1.17(p) is attached.

☐   In accordance with § 1.97(c), this Information Disclosure Statement is being filed after the period set forth in § 1.97(b) above but before the mailing date of either a Final Action under § 1.113 or a Notice of Allowance under § 1.311, or before an action that otherwise closes prosecution in the application, therefore:

> ☐   Certification in Accordance with § 1.97(e) is attached; or

> ☐   The fee of **$180.00** as set forth in § 1.17(p) is attached.

☐   In accordance with § 1.97(d), this Information Disclosure Statement is being filed after the mailing date of either a Final Action under § 1.113 or a Notice of Allowance under § 1.311 but before, or simultaneously with, the payment of the Issue Fee, therefore included are: Certification in Accordance with § 1.97(e); and the submission fee of **$180.00** as set forth in § 1.17(p).

☐   Copies of each of the references listed on the attached Form PTO-1449 are enclosed herewith.

☒ Copies of references listed on the attached Form PTO-1449 are enclosed herewith

☒ Copies of references listed on the attached Form PTO 1449 are not required to be submitted pursuant to the June 30, 2003 recent revisions to 37 CFR § 1.98(a)(2)(i).

EXCEPT THAT:

☒ In view of the voluminous nature of references 4, 7, 14, 19, 20 and the likelihood that these references are available to the Examiner, copies are not enclosed herewith.

☐ In accordance with § 1.98(d), copies of the following references listed on the attached Form PTO-1449 are not enclosed herewith because they were previously cited by or submitted to the U.S. Patent and Trademark Office in patent application(s) for which a claim for priority under 35 U.S.C.§ 120 have been made in the instant application:

☐ Copies of references **[list as appropriate]** listed on the attached Form PTO-1449 were previously cited by or submitted to the Patent and Trademark Office in prior Application No. , filed .

Please charge any deficiency or credit any overpayment to Deposit Account No. 23-3050. This form is submitted in duplicate.

☐   The relevance of those listed references which are not in the English language is as
       follows:

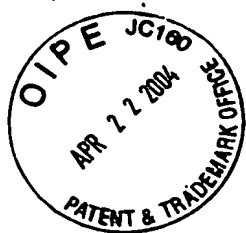☒   There are no listed references which are not in the English language.

Date: *April 19, 2004*

_____
Michael P. Dunnam
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		Form PTO-1449 Modified	Docket No. UPN-4366/P-3041	Application No. 10/734,799

| | | List of Patent and Publications
Cited by Applicant
(Use several sheets if necessary) | Applicant
Charles L. Epstein, et al. | |

		U.S. Department of Commerce Patent and Trademark Office	Filing Date December 12, 2003	Group Not Yet Assigned
			Confirmation No. Not Yet Assigned	

		OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)	
	1	Ablowitz, M., et al., "The inverse scattering transform-fourier analysis for nonlinear problems," *Studies in Applied Math.*, **1974**, *No. 4*, 249-315
	2	Beals, R., et al., "Scattering and inverse scattering for first order systems," *CPAM*, **1984**, *37*, 39-90
	3	Beals, R., et al. "Scattering and inverse scattering for first order systems: II.," *Inverse Problems*, **1987**, *3*, 577-593
*	4	Beals, R., et al., "Direct and inverse scattering on the line," *Am. Math. Soc., Providence*, **1988**
	5	Carlson, J., "Exact solutions for selective-excitation pulses. II. Excitation pulses with phase control" *J. of Mag. Res.*, **1992**, *97*, 65-78
	6	Carlson, J., "Exact solutions for selective-excitation pulses," *J. of Mag. Res.*, **1991**, *94*, 376-386
*	7	Faddeev, L., et al., "Hamiltonian Methods in the Theory of Solitions," *Springer Verlag, Berlin, Heidelberg, NY*, **1987**
	8	Grünbaum, F., et al., "An exploration of the invertibility of the bloch transform," *Inverse Problems*, **1986**, *2*, 75-81
	9	Le Roux, "Exact synthesis of radio frequency waveforms," *Proceedings of 7th Annual Meeting of SMRM*, **1988**, page 1049
	10	Moses, H.E., et al., "Eigenvalues and eigenfunctions associated with the gel'fand-levitan equation," *J. Math. Phys.*, **1984**, *25(1)*, 108-112

EXAMINER	DATE CONSIDERED

* A copy of these references will not be forwarded to the U.S. Patent and Trademark Office since they are believed to be too voluminous and easily obtainable by the Examiner.

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	OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)	
	11	Pauly, J., et al., "Parameter relations for the Shinnar-Le Roux Selective excitation pulse design algorithm," *IEEE Trans. On Med. Imaging,* **1991,** *10(1),* 53-65
	12	Rourke, D.E., et al., "The inverse scattering transform and its use in the exact inversion of the bloch equation for noninteracting spins," *J. of Mag. Res.,* **1992,** *99,* 1-20
	13	Rourke, D.E., A simple relationship between total RF pulse energy and magnetization response – the nonlinear generalization of parseval's relation," *J. of Mag. Reson.,* **1995,** *Series A(115),* 189-196
*	14	Rudin, W., "Real and complex analysis," *McGraw Hill, NY,* **1966**
	15	Shinnar, et al., "The application of spinors to pulse synthesis and analysis," *Mag. Res. In Med.,* **1989,** *12,* 93-98
	16	Shinnar, et al., "The synthesis of pulse sequences yielding arbitrary magnetization vectors," *Mag. Res. In Med.,* **1989,** *12,* 74-80
	17	Shinnar, M., et al., "The synthesis of soft pulses with a specified frequency response," *Mag. Res. In Med.,* **1989,** *12,* 88-92
	18	Shinnar, et al., in "Inversion of the bloch equation," *J. chem... Phys.,* **1993,** *98(8),* 6121-6128
*	19	Stein, E.M., et al., "Introduction to fourier analysis on Euclidean spaces, *Princeton Press, Princeton, NJ,* 1971
*	20	Widom, H., "Lectures on integral equations," *Van Nostrand; Reinhold Co., NY-Toronto, Ont-London,* **1969**
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		OTHER DOCUMENTS (Including Author, Title, Date, Pertinent Pages, Etc.)
	21	Zakharov, V., et al., "Korteweg-de Vries equation, a completely integrable Hamiltonian system," *Funk. Anal. Prilöz*, **1971**, *5(4)*, 18-27 (translated)
	22	Zakharov, V., et al., "On the complete integrability of the non-linear Schrödinger equation," *Teor. Mat. Fiz.*, **1974**, *19(3)*, 332-343 (translated)

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U. S. PATENT DOCUMENTS

Examiner Initial		Document No.	Date	Name	Class	Subclass
	23	5,153,515	10/06/92	Leigh, et al.	324	307
	24	5,572,126	11/05/96	Shinnar	324	314
	25	5,821,752	10/13/98	LeRoux	324	314

FOREIGN PATENT DOCUMENTS

Examiner Initial		Document No.	Date	Country	Translation	
					YES	NO

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